living matter and accounts for its purposive behaviour and development is to resurrect the buried concept of a *nisus formativus*. To do this is quite gratuitous, since Verworn supplies us with a guaranteed modern concept of a "self-steering" metabolism—the "self-steering" quality depending, of course, on the laws which physical chemistry has been revealing during recent years. He also assures us that there are no facts of organic being or becoming which warrant us in losing faith in the sufficiency of the monistic interpretation in terms of chemistry and physics. It is true that the illustrious physiologist has not found time in this lecture to give us any illustration of how any vital phenomenon may be formulated in terms of "the principles of the inorganic world," but he seems to have no doubt that it can be done.

As to the second question, before which so many have fallen away from monism—the question of psychical life as distinct from bodily life—Verworn finds satisfaction in boldly denying that any dualism exists. The dualistic idea was born out of ignorance fathered by desire, and it has been nurtured and refined by philosophy. The material ghost that escaped *in articulo mortis* has become a spiritual soul, but both are fallacious abstractions. It is pathetic to think of all the wrestlings with the problem of dualism since Descartes's day, for dualism is but one of man's many inventions with which he makes himself miserable. Just as the organism is a mere bundle of metabolisms, so the "ego" is but a changeful bundle of sensations, and perceptions, thoughts, and feelings derived from these—a complex the components of which are not continuously or simultaneously held in combination, though certain components, *e.g.* sensations of our body, occur so frequently and uniformly that the illusion of a persistent personality is produced. The material for the up-building of the "ego" is the external world or corporeal world—the world of sensations; the "make-up" of the "ego" is the same as the "make-up" of the world; the antithesis of soul and body is "a fossil idea." "Either everything is body in the world or everything is soul: however I like to put it, the main fact is that there is only one kind of thing." How a flux of sensations can give origin to that unified outlook and inlook which is called monism remains somewhat mysterious, but to think of any mystical principle being involved is "a negation of scientific thinking." But which is mysticism and which scientific thinking? J. A. T.

THE PLANT KINGDOM.

Das Pflanzenreich. Regni vegetabilis conspectus. Edited by Prof. A. Engler. (Leipzig: W. Engelmann; London: Williams and Norgate.)

AN account of the inception of this work was given in NATURE, October 30, 1902 (p. 657), with a list of the earliest parts. Twenty-one volumes have now been published, of which ten are devoted to monocotyledonous orders. The late Dr. K. Schumann has contributed, in addition to the Musaceæ, two memoirs on the Marantaceæ and the Zingiberaceæ respectively. In both these orders there is a large increase in numbers and a considerable amount of change as compared with the account given by Pedersen in the "Pflanzenfamilien." This is explained by the fact that an enormous number of new species have been made out of copious material received from Indo-Malaya and tropical Africa. The new species of Zingiberaceæ described for Malaya alone exceed a hundred. Dr. Schumann formulates very definite arguments in favour of the changes which he proposes in reviewing the history of the orders, and also presents a comprehensive discussion on the flower and on the relationships of the four orders which compose the series Scitamineæ.

Many of the orders are obviously too large to admit of their being treated in a single volume. The Orchidaceæ, as in the case of the "Pflanzenfamilien," have been entrusted to Prof. Pfitzer, and the first instalment contains the section Pleonandræ—formerly called Diandræ—which consists mainly of the Cypripediums as generally understood. A special feature of this volume is the list of hybrids, both natural and artificial. Similarly, the Araceæ require several parts, and Dr. Engler, who undertakes this order, begins with the tribe Pothoideæ. Dr. Engler gives a full description of the branching, and distinguishes nearly 500 species of Anthurium. A short volume includes the orders Scheuchzeriaceæ, Alismataceæ, and Butomaceæ, which are all worked out by Prof. Fr. Buchenau. Dr. W. Ruhland is responsible for the Eriocaulaceæ, and gives a detailed account of the geographical distribution, taking up the origin, evolution, and dispersal of the order. Owing to a large influx of new specimens from Brazil, the number of species of Eriocaulon now exceeds two hundred, and the genus Pæpalanthus, after being shorn of many species that form three new genera, still shows a slight increase.

The first volume dealing with a group of the gymnosperms, that on the Taxaceæ, has been written by Dr. R. Pilger. The Taxaceæ are profoundly interesting on account of the primitive forms which characterise some of the genera, but, as is usually the case with such genera, the number of species is small, and no great increase may be expected, although some new species may be looked for from the unexplored areas of China and eastern Asia.

Of dicotyledonous orders, the Tropæolaceæ, by Prof. Fr. Buchenau, appeared in 1902, and the Cistaceæ, by Dr. W. Grosser, and the Theophrastaceæ, by Prof. C. Mez, were issued in 1903. Since that time a larger volume on the Lythraceæ has been contributed by Dr. E. Koehne, who has gone very fully—in fact, more fully than seems necessary—into the varieties and forms of the more variable species. The genus Cuphea is amplified to 200 species, and the genus Rotala is extended to include some species previously assigned to Ammannia. A list of plant collectors and their contributions is added. One of the most complete and interesting memoirs is that by Prof. H. Winkler on the Betulaceæ. The general sketch contains sections on the geographical distribution and the history of the order. The fossil forms, which are numerous, are enumerated without comment, but with references,

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and—a feature that one would have expected in every volume—maps are provided to indicate generic distribution.

The main purpose of the "Pflanzenreich," as contrasted with the "Pflanzenfamilien," is to provide an authentic description of species, and criticism of this work has largely to deal with considerations that are best known to the learned authors who have undertaken to write on the different orders. One of the main difficulties consists in reconciling the diverse views held by different writers who have made a special study of the same orders and groups. The discussion of certain forms under *Betula papyrifera* furnishes an instance in which Dr. Winkler holds different views from Prof. C. S. Sargent; without attempting to judge between the two opinions, it would seem that Prof. Sargent has had better opportunities of studying these forms, but it should be added that in this case the writer has fully stated both views: the ideal solution in such a case would be a collaboration of both authorities, if such a collaboration were practicable. It is from this point of view that one could have wished to see the names of other besides German botanists associated with this great undertaking; so far, Dr. Rendle, who wrote the volume on the Naiadaceæ, is the only exception. The commendable spirit of *camaraderie* which exists between botanists has been amply demonstrated in the various international meetings, of which the latest was recently held in Vienna, and it would not appear to be a matter beyond practical realisation to give a more international character to this *magnum opus*.

AN ITALIAN TEXT-BOOK OF PHYSIOLOGY.

Physiologie des Menschen. By Dr. Luigi Luciani. Ins Deutsche übertragen und bearbeitet von Dr. S. Baglioni und Dr. H. Winterstein. Dritte Lief., pp. 323+502+viii. Vierte Lief., pp. 160. (Jena: G. Fischer, 1905.)

THE general features and aims of Dr. Luciani's text-book of human physiology have already been alluded to in the review of the first two parts, and need not be recapitulated here. The first few pages of the third part complete the account of the physicochemical phenomena of respiration. The following chapter gives an excellent account of the mechanics of respiration, including the influence of the respiratory movements on arterial and venous blood pressures.

The succeeding chapter, on the nervous mechanism of respiration, is specially good, and one cannot fail to admire the mastery of the literature of the subject shown by the author, every page giving evidence of knowledge of the original sources. The subject of the localisation of the bulbar, spinal, and cerebral respiratory centres is fully dealt with, the results obtained by the earlier observers—Legallois, Flourens, Schiff and others—being well epitomised. A good *résumé* is also given of the important later results obtained by Gad and Marinescu on the localisation of the bulbar respiratory centres. Reference is also made to the interesting results yielded by Aducco's research on the action of cocaine upon the respiratory centres.

The author next gives an account of the influence upon the respiratory centres exerted by stimuli transmitted by afferent nerves. A considerable amount of space is devoted to the important work of Hering, Breuer, and others on the self-regulatory mechanism subserved by the vagi. The later experiments of Head have been omitted.

The subjects of apnœa and periodic respiration are discussed with great fulness, much of the author's own work being given.

The next chapter deals with lymph—its sources, physical, chemical, and morphological characters, its circulation, and the theories of its formation. An excellent critical account is given of the secretion theory of Heidenhain, as compared with physicochemical theories of the majority of later workers in this field. In the concluding pages of this chapter the structure and functions of the lymph glands and lymphoid organs—bone marrow, thymus, and spleen—are fully described.

The first chapter of the second volume is devoted to the subject of the internal secretions of the ductless glands. After a brief introductory account of the historical development of our knowledge of glandular secretion, the author passes to a detailed description of the structure and functions of the thyroid and parathyroids. The treatment of the physiology of the thyroid and parathyroids is so complete and full of interest that only a brief reference to the most salient points is possible. The various theories which have been held with regard to the results of removal are critically reviewed. Very full treatment is accorded to the experimental foundations for the theory of an auto-intoxication. In this connection, the results obtained by Colzi and others by means of the method of crossed transfusion are of great interest and importance. Gley's ingenious experiments on the relative toxicity of the blood serum of normal dogs as compared with that of dogs from which the thyroids had been previously removed are also fully described. An important section of this chapter is devoted to the theories of independent specific functions of the thyroid and parathyroids, and to the experimental basis on which these theories are founded.

The structure and still obscure physiology of the pituitary gland are briefly epitomised. A satisfactory account is next given of the structure and functions of the suprarenal glands, although in this case the results obtained by English workers have not been sufficiently recognised by the author.

The following chapter deals with the external digestive secretions of the salivary glands, pancreas, gastric and intestinal mucosæ, and liver. The final chapter is devoted to the mechanical and chemical phenomena of buccal and gastric digestion. The account has been kept well abreast of the most recent advances, many important additions being made by the translators.

A perusal of the third and fourth parts strengthens the impression that the complete work will prove itself to be a most trustworthy and illuminative guide to modern physiology.

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